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THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD

'PH21T'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twelfth day of September, in the year two thousand one.

Attest:

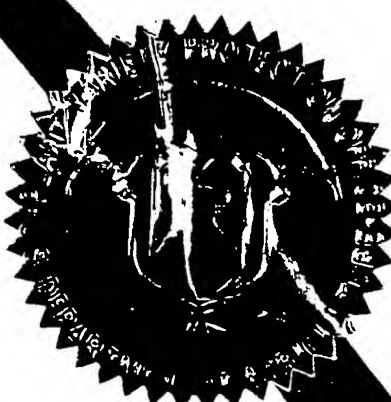
Paul M. Zerkow

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Wilson et al.

Wilson et al.
App. No. 10/768,407

REF
A7



REPRODUCE LOCALLY. Include form number and date on all reproductions.

FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER		3. VARIETY NAME	
Pioneer Hi-Bred International, Inc.				PH21T	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)		FOR OFFICIAL USE ONLY PVPO NUMBER 9800354	
Research and Product Development P.O. Box 85 Johnston, IA 50131-0085		515/270-4051			
		6. FAX (include area code)		F I L I N G	
		515/253-2125		DATE 5/10/1998	
7. GENUS AND SPECIES NAME		8. FAMILY NAME (Botanical)		F I L I N G AND EXAMINATION FEE:	
Zea Mays		Gramineae		F E E S \$ 2450.00	
9. CROP KIND NAME (Common name)				DATE 8-5-98	
Corn				CERTIFICATION FEE:	
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)				F E E S \$ 320.00	
Corporation				DATE 7/10/2001	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION			
Iowa		May 6, 1926			
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS				14. TELEPHONE (include area code)	
Steven R. Anderson Research and Product Development P.O. Box 85 Johnston, IA 50131-0085				515/270-4051	
				15. FAX (include area code)	
				515/253-2125	
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)					
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasury of the United States" (Mail to PVPO)					
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)					
<input type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input checked="" type="checkbox"/> NO (If "no," go to item 20)					
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?			19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?		
<input type="checkbox"/> YES <input type="checkbox"/> NO			<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED		
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES?					
<input type="checkbox"/> YES (If "yes," give names of countries and dates) <input checked="" type="checkbox"/> NO					
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.					
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.					
Applicant(s) is(are) informed that false representation herein can jeopardize protection and results in penalties.					
SIGNATURE OF APPLICANT (Owner(s))			SIGNATURE OF APPLICANT (Owner(s))		
			Steven R. Anderson		
NAME (Please print or type)			NAME (Please print or type)		
			Steven R. Anderson		
CAPACITY OR TITLE		DATE		DATE	
				7/29/98	
		Senior Research Associate			

INSTRUCTIONS

9803254

GENERAL: To be effectively filed with the Plant Variety protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed Exhibits A,B,C,E; (3) at least 2,500 viable untreated seeds, or for tuber reproduced varieties verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in a approved public repository; (4) check drawn on a U.S. bank for \$2,450 (\$300 filing fee and \$2,150 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Blvd., Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$300 for issuance of the Certificate.

Plant Variety Protection Office
Telephone: (301) 504-5518

ITEM

- 16a. Give:
- (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
 - (2) the details of subsequent stages of selection and multiplication;
 - (3) evidence of uniformity and stability; and
 - (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified.
- 16b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
- (1) identify these varieties and state all differences objectively;
 - (2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences;
 - (3) submit, if helpful, seed and plant specimens of photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 16c. Exhibit C forms are available from the PVPO for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 16d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 16e. Section 52(5) of the Act required applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
17. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant may NOT reverse this affirmative decision after the variety has been sold and so labelled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
20. See sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of Regulations and Rules of Practice.)

To avoid conflict with other variety names in use, the applicant should check the variety names proposed by contacting: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center-East, Beltsville, MD 20705.
Telephone: (301) 504-8089.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Janie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter. Under the PRA of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs). Persons with disabilities who require alternative means for communication program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791. To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call (202) 720-7327 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

Exhibit A. Origin and Breeding History

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Pedigree: PHEH5/PHR03)X22223X

Pioneer Line PH21T, Zea mays L., a dent corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross PHEH5 X PHR03 (PVP Certificate Number 9100097) using the pedigree method of breeding. The progenitors of PH21T are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Variety PHEH5 was derived from a single cross hybrid PHR12 X PHV78 (PVP Certificate Number 8800003). The progenitors are proprietary varieties of Pioneer Hi-Bred International, Inc.. Variety PHR12 was derived from a single cross hybrid PH814 X PH848. The varieties C103, OS420, 38-11, OS426 contributed greatly to the genotype in the derivation of PH814. Varieties SRS303, OH43, OS420, OS426, MINN49, IDT, AR4, I205, SRS303, and LF51 contributed to the genotype in the derivation of PH848. Selfing and selection were practiced within the above F1 cross (PHEH5 X PHR03) for 6 generations in the development of PH21T at Macomb, Illinois. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Macomb, Illinois, as well as other Pioneer research locations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PH21T has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 6 generations with careful attention paid to uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PH21T.

The criteria used in the selection of PH21T were kernel texture, yield, both per se and in hybrid combinations; kernel size, especially important in production; ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance. Hybrids with PH21T as a parent have good gray Leaf Spot tolerance.

The line PH21T has been increased both by hand and in isolated fields with continued observations for uniformity and stability throughout development, and for 3 generations during the final stages of inbred development and seed multiplication.

JMS
8/13/01

9803854

DEVELOPMENTAL HISTORY FOR PH21T

<u>Season/Year</u>	<u>Inbreeding Level</u>
Winter 1990	F1
Summer 1991	F2#
Summer 1992	F3#*
Summer 1993	F4#*
Summer 1994	F5#*
Winter 1994	F6#*
Summer 1995	F7#*
Winter 1995	F8 Bulk Increase

#PH21T was selfed and selected through F7 generation.

*PH21T was selfed and ear-rowed from F3 through F7 generation.

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Exhibit B. Novelty Statement

PH21T mostly resembles Pioneer Hi-Bred International, Inc. proprietary inbred line PHR03 (PVP Certificate No. 9100097). Collectively, the traits in table 1A, 1B and 2 show measurable differences between the two varieties. Variety PH21T (shank length = 11.2 cm) has a shorter shank length than PHR03 (shank length = 15.3 cm). Variety PH21T (stalk diameter = 19.0 mm) has a smaller stalk diameter than PHR03 (stalk diameter = 25.0 mm). Variety PH21T (tassel peduncle length = 22.6 cm) has a longer tassel peduncle length than PHR03 (tassel peduncle length = 17.2 cm) (Table 1A, 1B). Variety PH21T (GDUSHD = 1516) sheds pollen 23 gdu's sooner than PHR03 (GDUSHD = 1539). Variety PH21T (GDUSLK = 1539) reaches 50% silking 39 gdu's sooner than PHR03 (GDUSHD = 1578) (Table 2).

10/6/18
SMT
For table 1A and 1B a paired t-test was used and the appropriate parameters are given. It is difficult to collect standard deviations for Table 2 due to the way the historical data was stored. For Table 2 a paired comparison was used. The statistical test used was a paired comparison to compare differences between means. These types of comparisons are common in agricultural experiments and should satisfy the criteria and assumptions satisfactorily.

Exhibit B Novelty Statement Tables

Table 1A. These data indicate differences between varieties PH21T and PHR03. Data are from multiple environments. A t-test was used to compare differences between means. Data is broken out by environments in 1997.

station	loc	year	Trait	variety	variety	Count	Mean	Mean	Mean	Mean	StdDev	StdDev	StdDev	StdDev	DF	t-Value	Prob (2-tail)
AD	20N	1997	shank length (cm)	PH21T	PHR03	5	5	10.8	16.0	-5.2	2.683	2.828	1.200	1.265	8	-2.98	0.018
JH	21	1997	shank length (cm)	PH21T	PHR03	5	5	11.6	14.6	-3.0	2.702	0.894	1.208	0.400	8	-2.36	0.046
AD	20N	1997	stalk diameter (mm)	PH21T	PHR03	5	5	20.0	26.8	-6.8	1.871	3.834	0.837	1.715	8	-3.56	0.007
JH	21	1997	stalk diameter (mm)	PH21T	PHR03	5	5	18.0	23.2	-5.2	2.915	3.347	1.304	1.497	8	-2.62	0.031
AD	20N	1997	tassel peduncle length (cm)	PH21T	PHR03	5	5	24.4	18.4	6.0	2.881	1.817	1.288	0.812	8	3.94	0.004
JH	21	1997	tassel peduncle length (cm)	PH21T	PHR03	5	5	20.8	16.0	4.8	2.188	1.225	0.970	0.548	8	4.31	0.003

Table 1B. Summary data pooled across environments in 1997.

year	Trait	variety	variety	Count	Count	Mean	Mean	Mean	Mean	StdDev	StdDev	StdDev	StdDev	DF	t-Value	Prob (2-tail)
		1	2	1	2	1	2	Diff	Diff	1	2	Error	Error	Pooled	Pooled	Pooled
1997	shank length (cm)	PH21T	PHR03	10	10	11.2	15.3	-4.1	2.573	2.111	0.814	0.667	18	-3.90	0.001	
1997	stalk diameter (mm)	PH21T	PHR03	10	10	19.0	25.0	-6.0	2.539	3.887	0.803	1.229	18	-4.09	0.001	
1997	tassel peduncle length (cm)	PH21T	PHR03	10	10	22.6	17.2	5.4	3.062	1.932	0.968	0.611	18	4.72	0.000	

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Exhibit B Novelty Statement Tables

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Table 2. These data indicate differences between varieties PH21T and PHR03. Data are from multiple locations and years grown primarily in the adapted growing area. Values are for growing degree units to 50% shed (GDUSHD), growing degrees to 50% silking, and Gray Leaf Spot score (GLFSPT).

Variety 1 = PH21T

Variety 2 = PHR03

		GDU	GDU	GLF
	VAR	SHD	SLK	SPT
YEAR	#	ABS	ABS	ABS
95	1	1505.0	1533.0	6.5
	2	1531.0	1577.0	4.5
	LOCS	22	22	4
	REPS	22	22	4
	PROB	.010+	.000#	.016+
96	1	1517.0	1531.0	5.8
	2	1534.0	1571.0	4.9
	LOCS	35	34	9
	REPS	35	34	14
	PROB	.075*	.001#	.056*
97	1	1526.0	1558.0	6.0
	2	1555.0	1589.0	4.9
	LOCS	22	22	6
	REPS	22	22	11
	PROB	.002#	.001#	.010+
TOTAL SUM	1	1516.0	1539.0	6.0
	2	1539.0	1578.0	4.8
	LOCS	79	78	19
	REPS	79	78	29
	DIFF	23	39	1.2
	PROB	.000#	.000#	.000#

United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

9803354

Objective Description of Variety
Corn (Zea mays L.)

Name of Applicant (s) Pioneer Hi-Bred International, Inc.	Variety Seed Source	Variety Name or Temporary Designation PH21T
Address (Street & No., or RFD No., City, State, Zip Code and Country) 7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085		FOR OFFICIAL USE PVP Number 9803354
Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by an '*' are considered necessary for an adequate variety description and must be completed.		
COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices: describe #25 and #26 in Comments section):		
01=Light Green 02=Medium Green 03=Dark Green 04=Very Dark Green 05=Green-Yellow	06=Pale Yellow 07=Yellow 08=Yellow Orange 09=Salmon 10=Pink-Orange	11=Pink 12=Light Red 13=Cherry Red 14=Red 15=Red & White 16=Pale Purple 17=Purple 18=Colorless 19=White 20=White Capped 21=Buff 22=Tan 23=Brown 24=Bronze 25=Variegated (Describe) 26=Other (Describe)
STANDARD INBRED CHOICES (Use the most similar (in background and maturity) of these to make comparisons based on grow-out trial data):		
Yellow Dent Families:	Yellow Dent (Unrelated):	Sweet Corn:
Family Members	Co109, ND246, Oh7, T232, W117, W153R, W18BN	C13, Iowa5125, P39, 2132
B14 CM105, A632, B64, B68 B37 B37, B76, H84 B73 N192, A679, B73, NC268 C103 Mo17, Va102, Va35, A682 Oh43 A619, MS71, H99, Va26 WF9 W64A, A554, A654, Pa91	White Dent: C166, H105, Ky228	Popcorn: SG1533, 4722, HP301, HP7211 Pipcorn: Mo15W, Mo16W, Mo24W

Ceres/wurdata/doug/96gvp

300354

EXHIBIT C: PH21T

1. TYPE: (describe intermediate types in Comments section):				Standard Variety Name	
2 1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental				MO17	
2. REGION WHERE DEVELOPED IN THE U.S.A.:				Standard Seed Source	
5 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other				PI 558532	
3. MATURITY (In Region of Best Adaptability; show Heat Unit formula in 'Comments' section)				DAYS HEAT UNITS	
DAYS HEAT UNITS					
078	1,443.0	From emergence to 50% of plants in silk	077	1,401.0	
078	1,441.8	From emergence to 50% of plants in pollen	076	1,382.3	
004	0,088.0	From 10% to 90% pollen shed	004	0,088.5	
		From 50% silk to optimum edible quality			
066	1,161.5	From 50% silk to harvest at 25% moisture	069	1,215.5	
4. PLANT:				Standard Sample	
				Deviation Size	
216.3	cm Plant Height (to tassel tip)	12.12	04	223.3	14.22 04
086.8	cm Ear Height (to base of top ear node)	09.07	04	095.5	15.59 04
016.0	cm Length of Top Ear Internode	01.15	04	017.1	01.42 04
0.0	Average Number of Tillers	00.01	04	0.0	00.01 04
1.0	Average Number of Ears per Stalk	00.00	04	1.0	00.00 04
3	Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark			1	
5. LEAF:				Standard Sample	
				Deviation Size	
09.3	cm Width of Ear Node Leaf	00.74	04	09.0	01.04 03
79.7	cm Length of Ear Node Leaf	06.36	04	76.2	11.91 03
05	Number of leaves above top ear	00.50	04	06	00.95 04
35	Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)	10.39	04	40	11.27 04
03	Leaf Color (Munsell code) 5GY34			03	5GY34
1	Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)			1	
5	Marginal Waves (Rate on scale from 1=none to 9=many)			6	
5	Longitudinal Creases (Rate on scale from 1=none to 9=many)			7	
6. TASSEL:				Standard Sample	
				Deviation Size	
11	Number of Primary Lateral Branches	01.25	04	07	00.91 04
16	Branch Angle from Central Spike	06.19	04	36	08.04 04
54.5	cm Tassel Length (from top leaf collar to tassel tip)	01.37	04	64.1	02.35 04
8	Pollen Shed (rate on scale from 0=male sterile to 9=heavy shed)			7	
14	Anther Color (Munsell code) 5R34			01	2.5GY88
01	Glume Color (Munsell code) 5GY58			01	5GY58
2	Bar Glumes (Glume Bands): 1=Absent 2=Present			1	
Application Variety Data				Standard Variety Data	
Page 1					

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9860854

Application Variety Data

PH21T

Page 2

Standard Variety Data

7a. EAR (Unhusked Data):					
01 Silk Color (3 days after emergence) (Munsell code)	10Y810		01	2.5GY86	
02 Fresh Husk Color (25 days after 50% silking) (Munsell code)	5GY68		02	5GY68	
21 Dry Husk Color (65 days after 50% silking) (Munsell code)	10YR92		21	2.5Y8.54	
2 Position of Ear at Dry Husk Stage: 1= Upright 2= Horizontal 3= Pendant			2		
5 Husk Tightness (Rate of Scale from 1=very loose to 9=very tight)			5		
2 Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm)			2		
3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm)					
7b. EAR (Husked Ear Data):					
	Standard	Sample	Standard	Sample	
	Deviation	Size	Deviation	Size	
17.0 cm Ear Length	01.41	04	18.3	01.50	04
44.3 mm Ear Diameter at mid-point	00.96	04	36.8	00.96	04
134.5 gm Ear Weight	09.15	04	102.8	03.50	04
16 Number of Kernel Rows	00.50	04	11.0	00.00	04
2 Kernel Rows: 1=Indistinct 2=Distinct			2		
1 Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral			1		
09.0 cm Shank Length	02.94	04	11.0	00.82	04
2 Ear Taper: 1=Slight 2= Average 3=Extreme			1		
8. KERNEL (Dried)					
	Standard	Sample	Standard	Sample	
	Deviation	Size	Deviation	Size	
11.0 mm Kernel Length	00.00	04	11.0	00.00	04
08.3 mm Kernel Width	00.50	04	08.8	00.50	04
04.5 mm Kernel Thickness	00.58	04	04.5	00.58	04
17.8 % Round Kernels (Shape Grade)	04.35	04	32.0	09.00	03
1 Aleurone Color Pattern: 1=Homozygous 2=Segregating			1		
07 Aleurone Color (Munsell code)	1.25Y812		07	10YR814	
07 Hard Endosperm Color (Munsell code)	10YR714		07	10YR714	
03 Endosperm Type:			3		
1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch					
4=High Amylose Starch 5=Waxy Starch 6=High Protein					
7=High Lysine 8=Super Sweet (se) 9=High Oil					
10=Other					
26.3 gm Weight per 100 Kernels (unsized sample)	00.50	04	30.50	03.11	04
9. COB:					
	Standard	Sample	Standard	Sample	
	Deviation	Size	Deviation	Size	
23.8 mm Cob Diameter at mid-point	02.08	04	19.0	00.82	04
14 Cob Color (Munsell code)	10R46		14	2.5YR56	

Application Variety Data

Page 2

Standard Variety Data

10

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10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant);
leave blank if not tested; leave Race or Strain Options blank if polygenic):

A. Leaf Blights, Wilts, and Local Infection Diseases

	Anthracnose Leaf Blight (<i>Colletotrichum graminicola</i>)	
5	Common Rust (<i>Puccinia sorghi</i>)	7
	Common Smut (<i>Ustilago maydis</i>)	
	Eyespot (<i>Kabatella zeae</i>)	
	Goss's Wilt (<i>Clavibacter michiganense</i> spp. <i>nebraskense</i>)	
6	Gray Leaf Spot (<i>Cercospora zeae-maydis</i>)	4
	Helminthosporium Leaf Spot (<i>Bipolaris zeicola</i>) Race _____	
7	Northern Leaf Blight (<i>Exserohilum turcicum</i>) Race _____	7
8	Southern Leaf Blight (<i>Bipolaris maydis</i>) Race _____	7
3	Southern Rust (<i>Puccinia polysora</i>)	3
7	Stewart's Wilt (<i>Erwinia stewartii</i>)	6
	Other (Specify) _____	

B. Systemic Diseases

	Corn Lethal Necrosis (MCMV and MDMV)	
7	Head Smut (<i>Sphacelotheca reiliana</i>)	9
	Maize Chlorotic Dwarf Virus (MDV)	
	Maize Chlorotic Mottle Virus (MCMV)	
4	Maize Dwarf Mosaic Virus (MDMV)	3
	Sorghum Downy Mildew of Corn (<i>Peronosclerospora sorghi</i>)	
	Other (Specify) _____	

C. Stalk Rots

4	Anthracnose Stalk Rot (<i>Colletotrichum graminicola</i>)	4
	Diplodia Stalk Rot (<i>Stenocarpella maydis</i>)	
	Fusarium Stalk Rot (<i>Fusarium moniliforme</i>)	
	Gibberella Stalk Rot (<i>Gibberella zeae</i>)	
	Other (Specify) _____	

D. Ear and Kernel Rots

	Aspergillus Ear and Kernel Rot (<i>Aspergillus flavus</i>)	
5	Diplodia Ear Rot (<i>Stenocarpella maydis</i>)	3
5	Fusarium Ear and Kernel Rot (<i>Fusarium moniliforme</i>)	5
	Gibberella Ear Rot (<i>Gibberella zeae</i>)	
	Other (Specify) _____	

//

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); (leave blank if not tested) :

Banks grass Mite (*Oligonychus pratensis*)
 Corn Worm (*Helioverpa zea*)
 Leaf Feeding
 Silk Feeding
 mg larval wt.
 Ear Damage
 Corn Leaf Aphid (*Rhopalosiphum maidis*)
 Corn Sap Beetle (*Carpophilus dimidiatus*)
 European Corn Borer (*Ostrinia nubilalis*)
 5 1st Generation (Typically Whorl Leaf Feeding)
 2nd Generation (Typically Leaf Sheath-Collar Feeding)
 Stalk Tunneling
 cm tunneled/plant
 Fall Armyworm (*Spodoptera frugiperda*)
 Leaf Feeding
 Silk Feeding
 mg larval wt.
 Maize Weevil (*Sitophilus zeamais*)
 Northern Rootworm (*Diabrotica barberi*)
 Southern Rootworm (*Diabrotica undecimpunctata*)
 Southwestern Corn Borer (*Diatraea grandiosella*)
 Leaf Feeding
 Stalk Tunneling
 cm tunneled/plant
 Two-spotted Spider Mite (*Tetranychus urticae*)
 Western Rootworm (*Diabrotica virgifera virgifera*)
 Other (Specify) ———

3

12. AGRONOMIC TRAITS:

 5 Staygreen (at 65 days after anthesis) (Rate
 on a scale from 1=worst to excellent)
 2.2 % Dropped Ears (at 65 days after anthesis)
 % Pre-anthesis Brittle Snapping
 % Pre-anthesis Root Lodging
 0.4 Post-anthesis Root Lodging (at 65 days after anthesis)
 4.667.1 Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture)

3

0.0

0.0

2.137.1

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied):

1 Isozymes

0 RFLP's

0 RAPD's

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

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9800854

CLARIFICATION OF DATA IN EXHIBITS B AND C

Please note the data presented in Exhibit C, "Objective Description of Variety," are collected primarily at Johnston, Iowa. The data in Exhibit B is from comparisons of inbreds grown in the same tests in the adapted growing area of PH21T and in Johnston, IA.

The data collected in exhibit C were collected in 1996 and 1997 for page 1 and 2. There are environmental factors that differ from environment to environment. The environments had different planting dates. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits and be a source of variability. These data are based on 5 plants measured at each location. The variation between traits collected in different years is usually higher than variation between locations in a given year or within locations. Please see Table 3 for average temperature and rainfall information in 1996 and 1997.

JLS
8/13/01

9800354

Table 3. Temperature and Rainfall

TEMPERATURE

YEAR	MAY	JUN	JULY	AUG	AVERAGE
1994	59.8	70.7	71.9	69.0	67.9
1995	56.2	69.4	74.3	76.9	69.2
1996	56.2	69.3	71.3	70.5	66.8
1997	53.5	70.6	74.1	69.6	67.0
1998	64.7	66.6	74.8	73.5	69.9
1999	60.7	69.7	78.7	70.5	69.9

RAINFALL

YEAR	MAY	JUN	JULY	AUG	Total
1994	3.67	5.75	1.71	4.18	15.31
1995	5.04	4.19	2.94	2.87	15.04
1996	8.47	4.35	2.51	2.14	17.47
1997	4.32	3.27	4.10	1.36	13.05
1998	6.46	11.07	5.70	4.96	28.19
1999	6.46	4.54	4.45	6.55	21.85

**Exhibit D. Variety 1 = PH21T
Variety 2 = PHR03**

9800054

		BU	MST	TST	SDG	TIL	GDU	GDU	POL	POL	TAS	RT	STK	BRT	SCT	EAR	BAR	DRP	GRN	TEX	EAR	TAS	ECTH	GLF
VAR	ACR	ABS	ABS	WT	VGR	LER	SHD	SLK	WT	SC	SZ	LDG	LDG	STK	GRN	SZ	PLT	EAR	APP	EAR	MILD	WT	SPT	
YEAR	#	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	ABS	
95	1	51.8	19.3	60.2	5.9	1.1	1305.0	1533.0		5.6	5.8	87.0	94.0	98.5	5.7	6.0	94.4		6.5	6.5	5.3		6.5	
	2	68.9	19.2	57.5	5.5	1.4	1531.0	1577.0		7.8	6.6	67.6	92.0	94.4	5.7	7.0	98.2		6.5	7.0	5.5		4.5	
	LOCS	8	10	8	15	17	22	22		5	10	4	1	3	3	4	12		4	4	4		4	
	REPS	9	11	9	17	18	22	22		5	10	4	2	4	3	4	13		4	4	4		4	
	PROB	0.22	0.872	.001#	0.169	0.81	.010+	.000#		.020+	.022+	.081*		0.468	1	0.182	0.16		1	0.182	0.836		.016+	
96	1	64.1	29.1	55.0	4.7	0.6	1517.0	1531.0		5.3	5.6	100.0	88.2	100.0	7.3	5.0	87.7	97.9	6.0	6.5	9.0		5.0	
	2	53.3	28.3	52.6	5.2	0.8	1534.0	1571.0		5.0	6.0	95.0	98.6	100.0	5.7	7.0	85.2	100.0	6.7	6.0	9.0		4.7	
	LOCS	3	3	3	12	19	35	34		3	17	1	3	1	3	1	7	2	3	2	1		1	
	REPS	3	3	3	12	19	35	34		3	17	1	3	1	3	1	7	2	3	2	1		1	
	PROB	0.531	0.78	0.255	.010+	0.678	.075*	.001#		0.667	0.231		0.405		0.3		0.866	0.5	0.529	0.5			.056*	
97	1	82.2	14.9	65.5	5.2	2.7	1526.0	1558.0	153.4		6.3	99.5		100.0	7.0	6.0	98.1			6.5	4.2		6.0	
	2	71.2	15.2	62.2	5.9	0.6	1555.0	1589.0	165.6		7.0	100.0		100.0	7.8	7.0	98.2			8.0	8.0	5.2	4.9	
	LOCS	4	4	4	11	8	22	22	4		6	4	1	1	4	1	3		1	2	2	4	6	
	REPS	4	4	4	11	8	22	22	4		6	4	1	1	4	1	3		1	2	2	4	11	
	PROB	0.506	0.594	0.24	.004#	0.188	.002#	.001#	0.58		0.102	0.391			0.215		0.423			0.205	0.5	.011+	.010+	
TOTAL SUM	1	62.4	20.0	60.5	5.3	1.2	1516.0	1539.0	153.4	5.5	5.8	94.0	89.7	99.1	6.7	5.8	92.8	97.9	6.3	6.5	6.1	4.2	5.0	6.0
2	66.4	19.8	57.8	5.5	5.5	1.0	1539.0	1578.0	165.6	6.8	6.4	85.1	96.9	96.7	6.5	7.0	94.1	100.0	6.6	7.0	6.7	5.2	4.7	4.8
LOCS	15	17	15	38	44	44	79	78	4	8	33	9	4	5	10	6	22	2	7	8	7	4	1	19
REPS	16	18	16	40	45	45	79	78	4	8	33	9	5	6	10	6	23	2	7	8	7	4	1	29
DIFF	4	0.1	2.8	0.2	0.2	0.2	23	39	12.2	1.3	0.5	8.9	7.3	2.4	0.2	1.2	1.3	2.1	0.3	0.5	0.6	1	0.3	1.2
PROB	0.649	0.8	.001#	0.239	0.756	.000#	.000#	.000#	0.58	.083*	.005#	.085*	0.412	0.417	0.705	.034+	0.774	0.5	0.522	0.17	0.457	.011+		.000#

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U. S. C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) PIONEER HI-BRED INTERNATIONAL, INC.	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME PH21T
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 7301 NW 62nd AVENUE P.O. BOX 85 JOHNSTON, IA 50131-0085	5. TELEPHONE (include area code) 515-270-4051	6. FAX (include area code) 515-253-2125
7. PVPO NUMBER 9000354		

8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. ☒ YES ☐ NO9. Is the applicant (individual or company) a U.S. national or U.S. based company? ☒ YES ☐ NO

If no, give name of country

10. Is the applicant the original owner? ☒ YES ☐ NO If no, please answer one of the following:

a. If original rights to variety were owned by individual(s), is(are) the original owner(s) a U.S. national(s)?

☐ YES ☐ NO If no, give name of country

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

☐ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (if needed, use reverse for extra space):

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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